LIVERMORE LAB
REPORT

A weekly review of scientific and technological achievements from Lawrence Livermore National Laboratory, Dec. 5-9, 2011.

Popular Mechanics

AS PRECISE AS A SWISS WATCH

A newly installed rack for Dawn, which will help lay the foundation for the 20-petaFLOP Sequoia system.

To get a computer simulation that delivers an acceptable degree of accuracy when imitating a nuclear bomb, it has to model a 50-microsecond explosion in three dimensions down to a scale of 10 microns (70-100 microns is the width of a human hair).

Bruce Goodwin, head of the Lab's weapons program, says it requires the most powerful supercomputers in the world. "It gets very complicated. These things are imploding and exploding, and you have to track the fluid mechanics with the precision of a Swiss watch."

And while China may have the most powerful supercomputer today, Livermore is on its way to delivering a 20-petaFLOP (a thousand trillion floating point operations per second) machine that will do everything from predicting the path of hurricanes and decoding gene sequences, to analyzing the ocean floor and discovering oil.

As for Goodwin, he intends to use it to simulate a nuclear explosion.

To read more, go to *Popular Mechanics*.

SAY HELLO TO MY SHORT-LIVED FRIEND

An element that lives just a little less than a millisecond may have a place to call home in Livermore.

More than a decade ago, element 116 was created by Livermore and Russian scientists at a cyclotron in Dubna. Most recently, that element has a name for itself: livermorium.

Livermorium honors the Lab as well as the city of Livermore. (In 1997, Element 103 was designated lawrencium, in honor of the Lab's founder, Ernest O. Lawrence.)

To read more, go to *MSNBC*.

READY, WILLING AND WAITING

This transmitter sends data from an Environmental Continuous Air Monitor to a satellite that, in turn, relays the information to the Lab's National Atmospheric Release Advisory Center.

When the Mars Science Laboratory was rocketed into space recently, Lab researchers were on the ground "locked and loaded" at NASA's Kennedy Space Station.

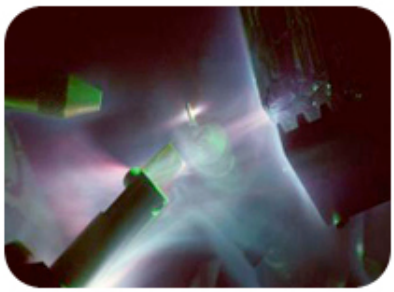
The spacecraft was powered by a nuclear source (plutonium 238) because the typical solar panels installed on spaceships would not generate enough energy to power the rover. The nuclear material produces a lot of heat that can be converted to electricity.

Lab employees Steve Homann and Ron Basket, who work in the Laboratory's National Atmospheric Release Advisory Center, were on the ground monitoring 30 radiological units – Environmental Continuous Air Monitors or ECAMs – in the unlikely event that the liftoff was not successful.

"We have 30 real-time radiological monitors, so we'll know right away if something happens," Basket said before the launch. "We're locked and loaded in case of a nuclear accident."

To hear the interview, go to *KGO Radio*.

R&D BEAM ME TO NEW RESEARCH



The Trident laser

By focusing proton beams using high-intensity lasers, a team of scientists have discovered a new way to heat material and create new states of matter in the laboratory.

Along with collaborators, Laboratory scientists unveiled new findings about how proton beams can be used in myriad applications.

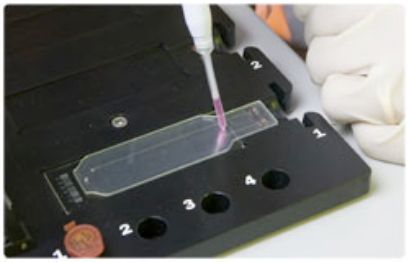
The experiments provide a new understanding of the physics involved in proton focusing, which affects how proton beams can be used in the future -- from heating material to creating new types of matter that couldn't be made by any other means, to medical applications and insights into planetary science.

One example includes focusing a proton beam on a solid density or compressed material, creating millions of atmospheres of pressure, thus allowing the study of the properties of warm dense matter found in the interior of giant planets such as Jupiter.

To read more, go to *R&D Magazine*.

SCIENCE TODAY at the University of California

CHANGING THE FACE OF PUBLIC HEALTH



The one-inch wide by three-inch long Lawrence Livermore Microbial Detection Array.

A new device developed by Laboratory scientists can detect and classify viruses and bacteria within 24 hours. This very device could change how public health is administered in the near future.

Tom Slezak, who leads the Lab's bioinformatics group, says their Microbial Detection Array has the potential to really change how public health is performed in this country.

"If you think about your health maintenance organization, your HMO, they are processing thousands of individuals a day," Slezak said. "They're looking at samples from sick kids. You're looking at runny noses and all kinds of other things. There are quite a few different organisms that could be causing people to be sick."

The microarrays allow the scientists to multiplex looking for many different organisms. Suddenly, they can identify what the causative agents are of disease, which will lead to much more effective treatments.

To hear the interview, go to *Science Today*.

AULD LANG SYNE

Lab Director George Miller bid adieu to the Laboratory Thursday during a retirement party held in his honor.

Miller, who has spent 40 years of his career in service to the Lab and the nation, announced his retirement earlier this year. Parney Albright succeeds him as the 11th Laboratory director.

The celebration included guest speakers and a special video tribute.

Miller's legacy and contributions to the Lab will not be forgotten, according to employees and guests.

LLNL applies and advances science and technology to help ensure national security and global stability. Through multi-disciplinary research and development, with particular expertise in high-energy-density physics, laser science, high-performance computing and science/engineering at the nanometer/subpicosecond scale, LLNL innovations improve security, meet energy and environmental needs and strengthen U.S. economic competitiveness. The Laboratory also partners with other research institutions, universities and industry to bring the full weight of the nation's science and technology community to bear on solving problems of national importance.

To send input to the *Livermore Lab Report,* send e-mail.

The *Livermore Lab Report* archive is available on the Web.